Nova Scotia Air Zone Report

Nova Scotia Air Quality Unit, 2014

NOVA SCOTIA

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Air Quality Management System (AQMS)

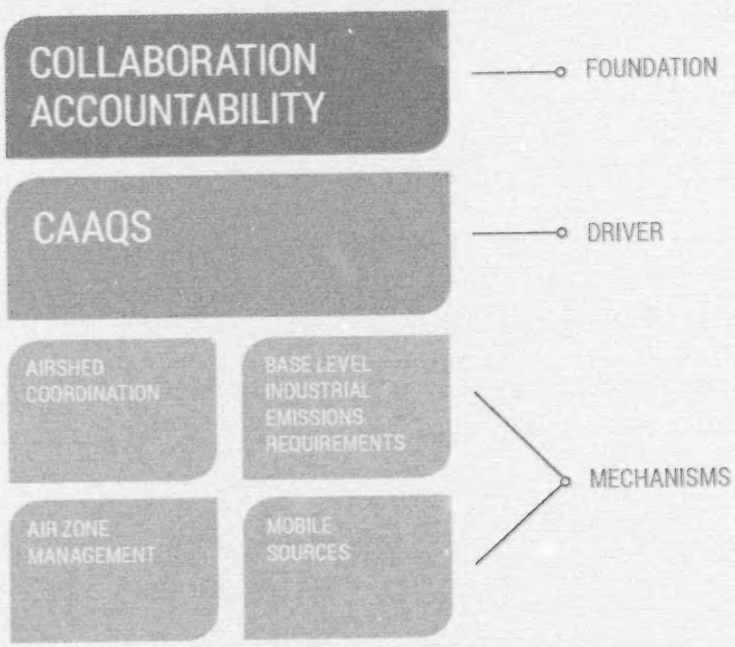
This is Nova Scotia's first air zone report. It is part of the Air Quality Management System (AQMS) implemented across Canada through the Canadian Council of Ministers of the Environment (CCME).[1]

The AQMS is a comprehensive approach, with four parts—"mechanisms"—working together to protect and improve outdoor (ambient) air quality. An essential part of this approach is for provinces and territories to use air zones as geographic regions for monitoring, managing and reporting on ambient air quality.

Other mechanisms are: base level industrial emissions requirements; mobile source emissions; and airshed coordination, where air over a very large area and different jurisdictions has similar conditions for air pollution that requires multiple governments to work together for improving air quality.

ELEMENTS OF THE AIR QUALITY MANAGEMENT SYSTEM

The Whole System



1 http://www.ccme.ca/en/resources/air/aqms.html

Air Zones

An air zone is a geographical region within a province or territory with common ambient air quality characteristics and an administrative structure for managing ambient air quality throughout the area. Relevant information is provided to local administrators to help them manage ambient air quality and achieve environmental objectives with stakeholders.

Nova Scotia Environment has four air zones, based on environmental factors and emissions that influence the quality of ambient air in each region. Air zone boundaries align with the department's four administrative regions (see map below).

- Western Air Zone—Annapolis, Digby, Kings, Lunenburg, Queens, Shelburne and Yarmouth Counties
- Central Air Zone—Halifax and Hants Counties
- Northern Air Zone—Antigonish, Colchester, Cumberland, Guysborough and Pictou Counties
- Eastern Air Zone—Cape Breton, Inverness, Richmond and Victoria Counties

NOVA SCOTIA'S 4 AIR ZONES MAP

Yellow dots indicate ambient air monitoring station locations.

Canadian Ambient Air Quality Standards and the Air Zone Management Framework

Nova Scotia Environment maintains a province-wide network of ambient air monitors with monitoring stations in each air zone.[2] Data from these stations are used in the AQMS air zone management framework to determine actions that may be needed for ambient air quality improvement. The framework has four air zone management levels, with activity driven by the Canadian Ambient Air Quality Standards (CAAQS) for ground-level ozone (GLO) and fine particulate matter ($PM_{2.5}$).

The CAAQS replace the Canada-wide Standards (CWS) for PM and GLO and have several advantages over the previous standards. First, the method for calculating the CAAQS is similar to the CWS, but the thresholds are lower and more stringent. In 2020, they will become even more stringent. Second, the new CAAQS include an annual fine particulate standard in addition to 8-hour ground-level ozone and 24-hour fine particulate matter standards (Table 1).

Table 1: The Canadian Ambient Air Quality Standards (CAAQS).

		Standards (numerical values)		
Pollutant	Averaging time	**2015**	**2020**	Metric
$PM_{2.5}$	24-hour (calendar day)	28 µg/m³	27 µg/m³	The 3-year average of the annual 98th percentile of the daily 24-hour average concentrations.
$PM_{2.5}$	Annual (calendar year)	10.0 µg/m³	8.8 µg/m³	The 3-year average of the annual average concentrations.
Ground-level Ozone	8-hour	63 ppb	62 ppb	The 3-year average of the annual 4th-highest daily maximum 8-hour average concentrations.

2 Historical and real-time data for all instruments at all stations can be accessed at http://www.novascotia.ca/nse/airdata/

Third, reporting for CWS achievement was only required for Census Metropolitan Areas (CMAs) – areas with a total population of at least 100,000 of which 50,000 or more live in the core. That meant that Halifax Regional Municipality was the only CMA in Nova Scotia. Now, the new CAAQS are used to determine whether we are meeting air quality standards in four air zones that cover all of Nova Scotia, including rural areas.

Finally, CWS achievement was reported as either above or below the standards' thresholds and did not have any management actions associated with the values. The CAAQS also report values relative to thresholds but have four categories of management actions, represented by colours, depending on how close any one standard in an air zone is to the threshold for exceedance. That is, when the CAAQS are achieved there are three management levels to maintain or prevent degraded air quality, and one level that requires actions to achieve air zone CAAQS if the CAAQS are exceeded (Table 2).

Table 2: The Air Quality Management Framework and associated threshold vales.

AIR MANAGEMENT THRESHOLD VALUES AND ACTIONS

Management Level	Management Actions	Air Management Threshold Values		
		Ozone (ppb)	$PM_{2.5}$ 24-hour ($\mu g/m^3$)	$PM_{2.5}$ Annual ($\mu g/m^3$)
Red[††]	Actions for Achieving Air Zone CAAQS	63	28	10
Orange	Actions for Preventing CAAQS Exceedance	56	19	6.4
Yellow	Actions for Preventing Air Quality Deterioration	50	10	4
Green	Actions for Keeping Clean Areas Clean	0	0	0

†† The threshold values for the 'Red' management level are equal to the numerical values of the Canadian Ambient Air Quality Standards (CAAQS).

2014 Air Zone Results for Nova Scotia

In 2014 the air zone measurement results were *below* CAAQS exceedance thresholds. In other words, the CAAQS were achieved in all air zones of Nova Scotia. In the Central air zone at least one result was in a range that requires actions for preventing air quality degradation (Yellow). The other three air zones had at least one result in a range that requires actions for preventing CAAQS exceedance (Orange) (Table 3).

Table 3. Canadian Ambient Air Quality Standards (CAAQS) achievement and management level results for air zone monitoring in Nova Scotia for 2014

NOVA SCOTIA AIR ZONE MANAGEMENT LEVELS AND CAAQS ACHIEVEMENT RESULTS – 2014 BASE YEAR (2012-2014 AVERAGE)

				Results		
Air Zone	Management Level*	Management Actions	Driver†	Ozone 8-hour (ppb)	$PM_{2.5}$ 24-hour (µg/m³)	$PM_{2.5}$ Annual (µg/m³)
Central	**Yellow**	Actions for Preventing AQ Deterioration	Ozone	**52**	**14**	**6.0**
Eastern	**Orange**	Actions for Preventing CAAQS Exceedance	$PM_{2.5}$ annual	**50**	**16**	**6.9**
Northern	**Orange**	Actions for Preventing CAAQS Exceedance	$PM_{2.5}$ 24-hr and annual	**45**	**21**	**7.5**
Western	**Orange**	Actions for Preventing CAAQS Exceedance	Ozone	**59**	**12**	**4.8**

* Management levels for each air zone are determined by the "Driver." These levels have continuous improvement as a priority and require more stringent actions as the driver approaches CAAQS limit.

† "Driver" means the pollutant that has the highest measurement relative to the CAAQS (Measurement CAAQS) within each air zone. There can be more than one driver in an air zone if relative measurements are equal. For example, in the 2014 reporting year the Northern Air Zone has two drivers because each are equal to 75% of the CAAQS (21/28 = 0.75 and 7.5/10 = 0.75)

Nova Scotia's Ambient Air Program

"Air pollution" is a generic phrase that refers to the presence of air pollutants and their mixtures in the atmosphere (*ambient* air). Air pollutants are any gas molecule or solid/liquid particle released into the atmosphere (air *emissions*) from natural and human-caused sources that can create adverse effects. Nova Scotia Environment's Air Quality Unit (AQU) monitors ambient air quality in Nova Scotia. The AQU collaborates with Environment Canada's National Air Pollution Surveillance (NAPS) Network to equip ambient air monitoring stations and share data.

Ambient air data collected by NSE are used for a variety of ambient air quality products besides air zone management and the NAPS network. For example, measurements of nitrogen dioxide (NO_2), GLO, and $PM_{2.5}$ are used to calculate the Air Quality Health Index (AQHI). This index is a communication tool for assisting individuals in making short-term decisions about adjusting their activities to limit exposure to air pollution. The AQHI is reported as a number from 1 to 10+ and as a risk category that has health messages associated with each category.[3]

The NSE ambient air monitoring network is not used to demonstrate compliance of large industrial emitters with their industrial approvals. Emissions from such sources do influence air quality measured by NSE's instruments, but the NSE stations are located to provide an overview of air quality as affected by all pollution sources.

On the other hand, when industrial approval holders are required to maintain ambient air stations, dispersion modelling is used by approval holders to determine the behaviour of their emissions — and to find the best locations to place their stations in order to measure the impact of their emissions on the ambient air.

Contact Us

For more information on ambient air quality monitoring, the AQMS, ambient air quality data or related products please visit **http://www.novascotia.ca/nse/air/** or contact us at **902-424-3600**.

3 http://weather.gc.ca/airquality/healthmessage_e.html